

## Chapter 7 Polynomial Functions

## 7-1 Polynomial Functions

ex

$$7z^3 - 4z^2 + z$$

Degree? 3 (In one variable)Leading coefficient? 7

ex

$$9y - 3y^2 + 4y^4$$

Degree? 4Leading coefficient? 4

ex

$$3c^2 + 4c - 2c^{-1}$$

Degree?            *Not a polynomial*Leading coefficient?           

$$f(x) = 3x^2 - 3x + 1$$

$$f(4) = 3(4)^2 - 3(4) + 1$$

$$= 37$$

$$f(-2) = 3(-2)^2 - 3(-2) + 1$$

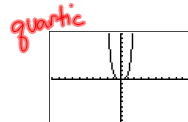
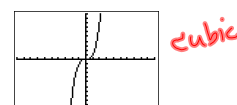
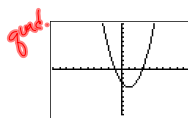
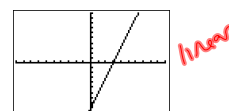
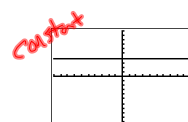
$$= 19$$

$$p(x) = 2x^4 - x^3 + 3x$$

$$p(4^3) = 2(4^3)^4 - (4^3)^3 + 3(4^3)$$

$$p(4^3) = 2 \cdot 4^{12} - 4^9 + 3 \cdot 4^3$$

Graphs of functions		Degree
Constant	$f(x) = 4$	0
Linear	$f(x) = 3x - 9$	1
Quadratic	$f(x) = x^2 - 2x - 3$	2
Cubic	$f(x) = x^3$	3
Quartic	$f(x) = x^4$	4
Quintic	$f(x) = x^5$	5



Even fns  
Same end  
behavior

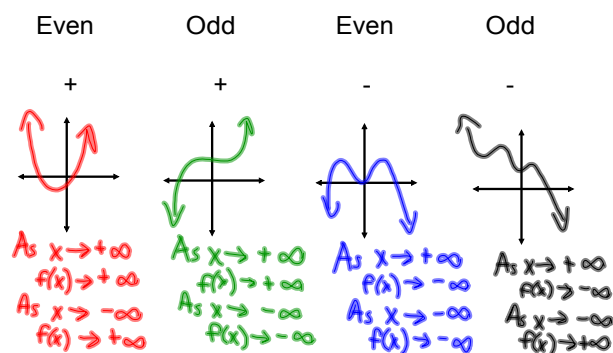
Odd fns  
different (opposite)  
end behavior

Let's look at the end behavior.

End Behavior--behavior of graph as  $x$  approaches  $+\infty$  and  $-\infty$

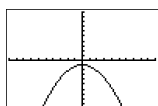
Determined by degree and leading coefficient

## Summary

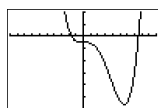


### Examples

- Describe the end behavior.
- Is the function odd or even?
- State the number of zeros.



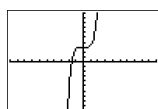
- As  $x \rightarrow +\infty$ , then  $f(x) \rightarrow -\infty$   
As  $x \rightarrow -\infty$ , then  $f(x) \rightarrow -\infty$
- Even
- 0



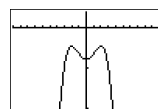
- As  $x \rightarrow +\infty$ , then  $f(x) \rightarrow +\infty$   
As  $x \rightarrow -\infty$ , then  $f(x) \rightarrow +\infty$
- even
- 2

### Examples

- Describe the end behavior.
- Is the function odd or even?
- State the number of zeros.



- As  $x \rightarrow +\infty$ , then  $f(x) \rightarrow +\infty$   
As  $x \rightarrow -\infty$ , then  $f(x) \rightarrow -\infty$
- odd
- 1



- As  $x \rightarrow +\infty$ , then  $f(x) \rightarrow -\infty$   
As  $x \rightarrow -\infty$ , then  $f(x) \rightarrow -\infty$
- even
- 0

## 7-2 Graphing Polynomial Functions

$$f(x) = x^4 + x^3 - 4x^2 - 4x$$

Roots  $\{-2, -1, 0, 2\}$

Relative max  $\{.941\}$

Relative min  $\{-1.383, -6.914\}$

Ex

$$f(x) = -x^3 - 4x^2 + 5$$

Roots  $\{-3.618, -1.382, 1\}$

Relative max  $\{5\}$

Relative min  $\{-4.481\}$

Degree      n

Turning points      at most n - 1

HW

p350-351

16-18, 21, 30, 39-42

p356

17, 23, 36-38